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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

WILKINS III, HARRY D

ART UNIT	PAPER NUMBER
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1742

DATE MAILED: 05/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/912,652

Applicant(s)

SEGAL ET AL.

Examiner

Harry D. Wilkins, III

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 April 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 37,38,40 and 42-51 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 40,50 and 51 is/are allowed.
- 6) ☒ Claim(s) 37,38 and 42-49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 24 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 04/13.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 13 April 2005 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 37, 38, 42, 43, 46 and 47 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Development of a submicrometer-grained microstructure in aluminum 6061 using equal channel angular extrusion" (*Development*, henceforth) with support from Metals Handbook in view of Park (US 4,589,932) and Dunlop et al (US 5,590,389).

Development teaches the invention substantially as claimed. *Development* teaches (see second section "Materials and Experimental Procedures") starting with aluminum alloy billets that have been hot extruded. Billets are ingots that have been

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subjected to deformation, and ingots are the product of casting, thus, the billets of *Development* are a "cast material" as the material was cast during its production. Next, the alloy is subjected to solution treatment (i.e.-solutionizing). Then the alloy is subjected to a predetermined set of routes of Equal Channel Angular Extrusion (ECAE), which corresponds to the steps of "defining ECAE routes for defining predetermined shear planes and crystallographic directions in the alloy, selecting at least a route from the defined routes for plastically deforming the alloy during ECAE and subjecting the alloy to a predetermined number of passes through the selected routes".

Extrusion, as defined by the Metals Handbook (page 15), is the plastic deformation of metal by pressing the metal through a die. Forging, as defined by the Metals Handbook (page 18), is the plastic deformation of metal into desired shapes with compressive forces, with or without dies. Thus, extrusion falls under the broad term forging. Hence, the product of *Development* includes both solutionizing and hot forging.

Regarding any additional steps present in the process of *Development*, the present claims recite a method "comprising the steps of", which is read to leave the method open to additional steps, even those which materially change the method.

Thus, *Development* fails to teach the step of homogenization before the hot forging step.

Park teaches (see title, abstract and col. 5, lines 24-35) performing a homogenizing treatment prior to forging/extruding for the purpose of improving strength and high toughness.

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Therefore, it would have been obvious to one of ordinary skill in the art to have applied homogenizing as taught by Park to the cast ingot prior to extruding of *Development* for the purpose of improved strength and toughness. It would have been within the expected skill of a routineer in the art to have applied all three hot steps without intermediate cooling in order to avoid efficiency losses caused by reheating the metal.

Thus, *Development* in view of Park do not teach that the metal composition is one of the compositions disclosed.

However, Dunlop et al teach (see col. 3, line 65 to col. 4, line 27) making sputtering targets using ECAE as is disclosed by *Development* from other compositions, including aluminum (pure and alloys), titanium (pure and alloys), copper (pure and alloys), tantalum (pure and alloys), gold (pure and alloys) and platinum (pure and alloys).

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the methodology of *Development* to any of the disclosed compositions of Dunlop et al because the method of *Development* improves the microstructure of sputtering targets thereby improving sputtering. The same metallurgical principles would apply to these alloys as would apply to the alloy of *Development*, such that one of ordinary skill in the art would have expected the method to produce the same results in other metals. When making the sputtering targets of Dunlop et al, one of ordinary skill in the art would have been motivated to make the billets into the conventional disc shape of standard sputtering targets.

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Regarding claim 38, *Development* teaches (see second column of page 2) that special processing steps were studied, including annealing of the material at 250°C after four passes of ECAE, i.e.-recovery annealing, which would inherently produce a substantially uniform grain size, global microstructure and texture. *Development* in view of Park teach homogenizing, hot forging and solutionizing of the cast material. When making the sputtering targets of Dunlop et al, one of ordinary skill in the art would have been motivated to make the billets into the conventional disc shape of standard sputtering targets. Thus, when performing the hot forging, it would have been obvious to one of ordinary skill in the art to have performed it in such a manner to form a disc by reducing the height to diameter ratio. *Development* further teaches performing the ECAE on solution treated billets, i.e.-without aging.

Regarding claim 42, *Development* teaches (see second column of page 2) subjecting the material to intermediate annealing between at least some of the passes.

Regarding claim 43, the intermediate annealing of *Development* is at 250°C (see second column of page 2), which is below the beginning stages static recrystallization, i.e.-recovery annealing.

Regarding claim 46, *Development* teaches (see second column of page 2) subjecting the material to annealing after 4 passes.

Regarding claim 47, the annealing of *Development* is at 250°C (see second column of page 2), which is below the beginning stages static recrystallization, i.e.-recovery annealing.

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4. Claims 44, 45, 48 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Development* in view of Park and Dunlop et al and further in view of "Stress-Relief Heat Treating of Steel".

Development in view of Park teach, as above in paragraph no. 4, performing the intermediate and/or post-extrusion annealing as a recovery annealing, i.e.-below the beginning stages of static recrystallization, thus, failing to meet the claimed limitations.

However, "Stress-Relief Heat Treating of Steel" teaches (see page 33, 1st column) that a heat treatment is applied to workpieces that have developed residual stresses in order to relieve the stresses thereby reducing distortion and preventing stress-corrosion cracking. "Stress-Relief Heat Treating of Steel" teach (see page 33, 2nd column) that residual stresses develop during rolling, casting, forging, bending, drawing or machining. Therefore, one of ordinary skill in the art would have expected the material of *Development* to have residual stresses due to the amount of deformation caused by the ECAE. "Stress-relief treatment" and "recovery annealing" are synonyms. (Though "Stress-Relief Heat Treating of Steel" is related to a ferrous metal, the same general metallurgical principles hold true for other non-ferrous alloys, such as aluminum.) Time and temperature were known to be result effective variables (see "Stress-Relief Heat Treating of Steel" at page 33, 3rd column), therefore, it would have been obvious to one of ordinary skill in the art to have optimized these process parameters to achieve the proper relief of stresses.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied the intermediate stress-relief treatment of *Development* at a higher temperature,

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such as at a temperature corresponding to the beginning temperature of full static recrystallization or at a temperature at or above the temperature of full static recrystallization, because the stress-relief treatment reduces stresses that cause brittle fracture during further cold working (for support see page 33, 1st column of "Stress-Relief Heat Treating of Steel").

Allowable Subject Matter

5. Claims 40, 50 and 51 are allowed.
6. The following is a statement of reasons for the indication of allowable subject matter: the prior art does not teach or suggest the step of removing material from the disc to form a billet which is subjected to ECAE.

Response to Arguments

7. Applicant's arguments filed 13 April 2005 have been fully considered but they are not persuasive. Applicant has argued that:

- a. The prior art does not teach all of the limitations of claim 37.

In response, the Examiner disagrees. As indicated in the rejection grounds above, the prior art teaches or suggests all of the claimed features.

- b. The prior art does not teach all of the limitations of claim 38.

In response, the Examiner disagrees. As indicated in the rejection grounds above, the prior art teaches or suggests all of the claimed features.


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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-Th 10am-8:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Harry D Wilkins, III
Examiner
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hdw